

We claim:

- 1 1. An efficiency optimizing apparatus for optimizing power efficiency in a transmitter,  
2 said efficiency optimizing apparatus comprising:
  - 3 a transmit power generator operable to produce an indication of desired average  
4 transmitted power;
  - 5 a signal converter operable to produce a first adjustment signal based, at least in  
6 part, on said indication of desired average transmitted power;
  - 7 a processor operable to:
    - 8 produce a second adjustment signal based, at least in part, on said  
9 indication of desired average transmitted power;
    - 10 determine a difference between said first adjustment signal and said  
11 second adjustment signal; and
    - 12 produce a correction value based on said difference; and
  - 13 a summer operable to produce a parameter signal, based on said correction  
14 value and said first adjustment signal, to control an aspect of operation of said  
15 transmitter.
- 1 2. The efficiency optimizing apparatus of claim 1 wherein said aspect of operation of  
2 said transmitter is an aspect of operation of a power amplifier of said transmitter.
- 1 3. The efficiency optimizing apparatus of claim 1 further comprising a gain controller  
2 operable to produce a gain control signal based on said indication of desired average  
3 transmitted power and where said signal converter is operable to produce said first  
4 adjustment signal based on said gain control signal.
- 1 4. The efficiency optimizing apparatus of claim 3 wherein said signal converter is a  
2 scaling unit operable to scale said gain control signal to produce said first adjustment  
3 signal.
- 1 5. The efficiency optimizing apparatus of claim 3 wherein said signal converter is a  
2 piecewise clipper operable to:

- 3 process said gain control signal according to a transfer function defined by at  
4 least one clipping parameter to produce said first adjustment signal;
- 5 where said transfer function includes at least one range of clipping values of said  
6 gain control signal for which said first adjustment signal is constant;
- 7 where said transfer function includes at least one range of scaling values of said  
8 gain control signal for which said first adjustment signal is a scaled version of  
9 said gain control; and
- 10 wherein said transfer function is a continuous function.
- 1 6. The efficiency optimizing apparatus of claim 1 wherein said processor employs:
- 2 a mapping procedure to produce said second adjustment signal by determining  
3 an ideal adjustment signal corresponding, in a mapping table, to said indication of  
4 desired average transmitted power;
- 5 a subtracting procedure to determine said difference between said first  
6 adjustment signal and said ideal adjustment signal; and
- 7 an accumulating procedure to add said difference to a previously existing value to  
8 produce said correction value.
- 1 7. The efficiency optimizing apparatus of claim 6 further employing a clipping procedure  
2 to limit said difference such that said difference does not exceed a limit value.
- 1 8. The efficiency optimizing apparatus of claim 6 further comprising:
- 2 an initial value memory adapted to supply an initial value to said accumulator;  
3 and
- 4 a digital to analog converter, having an output range, for converting said  
5 correction value to a correction signal.
- 1 9. The efficiency optimizing apparatus of claim 8 wherein said initial value is a middle  
2 value in said output range of said digital to analog converter.
- 1 10. The efficiency optimizing apparatus of claim 8 wherein said initial value is a mean  
2 value of said correction signal.

1 11. The efficiency optimizing apparatus of claim 10 where said mean value is  
2 determined through measuring and averaging said correction signal over a number of  
3 similar efficiency optimizing apparatus.

1 12. The efficiency optimizing apparatus of claim 10 where said mean value is  
2 determined through measuring said correction signal over a previous period of  
3 transmission.

1 13. The efficiency optimizing apparatus of claim 1 further comprising:

2 a mapper operable to receive a data indicator and, based on said data indicator,  
3 produce a value representative of a peak power to average power ratio; and

4 a summer operable to produce a sum of said value and said indication of desired  
5 average transmitted power;

6 wherein said processor is operable to produce said second adjustment signal  
7 based on said sum.

1 14. The efficiency optimizing apparatus of claim 1 wherein said signal converter is a hard  
2 wired device.

1 15. A method of optimizing power efficiency in a transmitter, said method comprising:

2 generating an indication of desired average transmitted power;

3 based on said indication of desired average transmitted power, producing a first  
4 adjustment signal;

5 based on said indication of desired average transmitted power, producing a  
6 second adjustment value;

7 determining a difference between a first adjustment value based on said first  
8 adjustment signal and said second adjustment value;

9 based on said difference, producing a correction value; and

10 based on said correction value and said first adjustment signal, producing a  
11 parameter signal to control an aspect of operation of said transmitter.

1 16. The method of claim 15 wherein said aspect of operation of said transmitter is an  
2 aspect of operation of a power amplifier of said transmitter.

1 17. The method of claim 15 wherein said transmitter includes a gain controlled amplifier  
2 and said method further comprises:

3 based on said indication of desired average transmitted power, producing a gain  
4 control signal for said gain controlled amplifier; and

5 based on said gain control signal, producing said first adjustment signal.

1 18. The method of claim 15 further comprising producing said second adjustment value  
2 by determining an ideal adjustment value corresponding, in a mapping table, to said  
3 indication of desired average transmitted power.

1 19. The method of claim 15 wherein said producing said second adjustment value  
2 further comprises:

3 producing an indication of desired peak transmitted power by summing said  
4 indication of desired average transmitted power with an indication of peak to  
5 average power ratio; and

6 based on said indication of desired peak transmitted power, producing said  
7 second adjustment value.

1 20. The method of claim 15 further comprising:

2 converting said correction value to a correction signal; and

3 based on said correction signal and said first adjustment signal, producing said  
4 parameter signal to control said aspect of operation of said transmitter.